
CLAIMS

[Claim(s)]
[Claim 1] the exterior -- and -- or with a feeling generation means to generate feeling according to an internal situation, and a storage means to memorize the predetermined parameter which specifies the content of action Robot equipment carried out [having a change means to change the above-mentioned parameter of the above-mentioned action according to the condition of the current above-mentioned feeling in the above-mentioned feeling generation means, and the control means which performs predetermined control processing for making the above-mentioned action discover based on the above-mentioned parameter by which change was carried out / above-mentioned /, and] as the description.
[Claim 2] The condition of the above-mentioned feeling can be expressed as a coordinate on the feeling space-dimensional [two or more] which is coordinate space. The above-mentioned parameter of the above-mentioned action It can express as a coordinate on the action space-dimensional [two or more] which is coordinate space. The above-mentioned change means Robot equipment according to claim 1 characterized by changing the condition of the above-mentioned current feeling into the coordinate on the above-mentioned action space according to predetermined response relation, and changing the above-mentioned parameter of the above-mentioned action which should be carried out a manifestation based on the above-mentioned coordinate of the condition of the above-mentioned feeling on the changed above-mentioned action space concerned.
[Claim 3] The above-mentioned change means is robot equipment according to claim 2 characterized by to change the above-mentioned parameter of the discovered above-mentioned action into the coordinate on the above-mentioned feeling space according to predetermined response relation, and to change the condition of the above-mentioned feeling in the above-mentioned feeling generation means based on the above-mentioned coordinate of the above-mentioned parameter on the changed above-mentioned feeling space concerned.
[Claim 4] The control data which specified actuation is memorized. about the configuration section which specialized in the above-mentioned feeling of specification [the above-mentioned storage means] beforehand -- ** -- the above-mentioned control means While performing predetermined control processing for making the above-mentioned action discover based on the above-mentioned parameter by which change was carried out [above-mentioned] Robot equipment according to claim 2 characterized by performing predetermined control processing for making the above-mentioned

actuation according to the condition of the above-mentioned current feeling in the above-mentioned feeling generation means discover based on the above-mentioned control data memorized by the above-mentioned storage means.
[Claim 5] It is robot equipment according to claim 1 which is equipped with a detection means detect the characteristic quantity of the stimulus concerned, about the stimulus given from the outside, and is characterized by for the above-mentioned change means to change the condition of the above-mentioned feeling in the above-mentioned feeling generation means according to the above-mentioned characteristic quantity of the above-mentioned stimulus detected by the above-mentioned detection means.
[Claim 6] the 1st step which memorizes the predetermined parameter which specifies the content of action, and the exterior -- and -- or the control approach of the robot equipment characterized by to have the 2nd step to which the above-mentioned parameter of the above-mentioned action changes according to the condition of the current above-mentioned feeling, and the 3rd step which make robot equipment discover the above-mentioned action based on the parameter concerned which changed while generating feeling according to an internal situation.
[Claim 7] The condition of the above-mentioned feeling can be expressed as a coordinate on the feeling space-dimensional [two or more] which is coordinate space. The above-mentioned parameter of the above-mentioned action It can express as a coordinate on the action space-dimensional [two or more] which is coordinate space. At the 2nd step of the above The condition of the above-mentioned current feeling is changed into the coordinate on the above-mentioned action space according to predetermined response relation. The control approach of the robot equipment according to claim 6 characterized by changing the above-mentioned parameter of the above-mentioned action which should be carried out a manifestation based on the above-mentioned coordinate of the condition of the above-mentioned feeling on the changed above-mentioned action space concerned.
[Claim 8] The control approach of the robot equipment according to claim 7 characterized by to change the above-mentioned parameter of the above-mentioned action which discovered into the coordinate on the above-mentioned feeling space according to predetermined response relation at the 2nd step of the above, and to change the condition of the above-mentioned feeling in the above-mentioned feeling generation means based on the above-mentioned coordinate of the above-mentioned parameter on the changed above-mentioned feeling space concerned.
[Claim 9] The control data which specified actuation is memorized. about the configuration section which specialized in the specific above-mentioned feeling beforehand at the 1st step of the above -- ** -- at the 3rd step of the above The control approach of the robot equipment according to claim 6 characterized by making the above-mentioned robot equipment discover action and the actuation concerned concerned based on the parameter of the above-mentioned action which changed in the 2nd step of the above, and the above-mentioned control data of the above-mentioned actuation according to the condition of the above-mentioned current feeling.
[Claim 10] The control approach of the robot equipment according to claim 6 which detects the characteristic quantity of the stimulus given from the outside, and is characterized by changing the condition of the above-mentioned feeling according to the detected characteristic quantity concerned.
[Claim 11] A feeling generation means to generate feeling, and a storage means to

memorize the predetermined parameter which specified the content of action, The control means which performs predetermined control processing for opting for action based on the condition of the current above-mentioned feeling in the above-mentioned feeling generation means, and making the action concerned discover based on the above-mentioned parameter of the action concerned for which it opted, Robot equipment characterized by having a change means to change the condition of the above-mentioned feeling in the above-mentioned feeling generation means based on the above-mentioned parameter of the discovered above-mentioned action.

[Claim 12] The condition of the above-mentioned feeling can be expressed as a coordinate on the feeling space-dimensional [two or more] which is coordinate space. The above-mentioned parameter of the above-mentioned action It can express as a coordinate on the action space-dimensional [two or more] which is coordinate space. The above-mentioned change means The above-mentioned parameter of the action which carried out [above-mentioned] the manifestation is changed into the coordinate on the above-mentioned feeling space according to predetermined response relation. Robot equipment according to claim 11 characterized by changing the condition of the above-mentioned feeling in the above-mentioned feeling generation means based on the coordinate of the above-mentioned parameter on the changed above-mentioned feeling space concerned.

[Claim 13] While generating feeling according to the situation of the 1st step which memorizes the predetermined parameter which specified the content of action, and the exterior and the interior The 2nd step which it opts [step] for action based on the condition of the current above-mentioned feeling, and makes robot equipment discover the action concerned based on the above-mentioned parameter of the action concerned for which it opted, The control approach of the robot equipment characterized by having the 3rd step to which the condition of the above-mentioned feeling is changed based on the above-mentioned parameter of the discovered above-mentioned action.

[Claim 14] The condition of the above-mentioned feeling can be expressed as a coordinate on the feeling space-dimensional [two or more] which is coordinate space. The above-mentioned parameter of the above-mentioned action It can express as a coordinate on the action space-dimensional [two or more] which is coordinate space. At the 3rd step of the above The above-mentioned parameter of the discovered above-mentioned action is changed into the coordinate on the above-mentioned feeling space according to predetermined response relation. The control approach of the robot equipment according to claim 13 characterized by changing the condition of the above-mentioned feeling in the above-mentioned feeling generation means based on the coordinate of the above-mentioned parameter on the changed above-mentioned feeling space concerned.

[Translation done.]

2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention is applied to a robot with feeling, concerning robot equipment and its control approach, and is suitable.
[0002]
[Description of the Prior Art] In recent years, the robot of a 4-piece walk mold is developed and sold by this application applicant for a patent. This robot has an appearance configuration similar to the dog bred at ordinary homes, or a cat, generates self feeling according to "it strikes", the influence from the user of "stroking", a surrounding environment, etc., and he is made as [act / it / autonomously], considering the condition of the feeling concerned.
[0003]
[Problem(s) to be Solved by the Invention] By the way, in this conventional robot, considering self feeling as mentioned above, as an approach that it may be made to make it act autonomously, two or more actions are beforehand prepared for every condition of feeling, respectively, and in case feeling is expressed, the approach of choosing one action from corresponding actions and discovering this is used.
[0004] For example, when the value of the parameter showing a certain feeling was 50, the action "A", "B", and "C" was prepared, and when the value of the parameter concerned was 80, some actions were prepared for condition of preparing the action "D", "E", and "F" in which the content of action completely differs from "A" - "C" to the condition of various feeling, respectively.
[0005] However, since according to this approach the part and development which need to prepare two or more actions for every condition of each feeling, respectively made it complicated and what has a big capacity as memory for holding the control parameter which specifies the various contents of action in the interior of a robot was needed, the number of actions which can be prepared was limited and there was a problem which cannot perform sufficient feeling expression.
[0006] Therefore, if it can make it possible to perform various feeling expressions with the small number of actions, it will be thought that a robot with more high entertainment nature can be offered, aiming at lowering of cost.
[0007] This invention was made in consideration of the above point, and tends to propose the high robot equipment and its control approach of entertainment nature.
[0008]
[Means for Solving the Problem] In order to solve this technical problem, it sets to this invention. robot equipment -- setting -- the exterior -- and -- or with a feeling generation means to generate feeling according to an internal situation A storage means to memorize the predetermined parameter which specifies the content of action, and a change means to change the parameter of action according to the condition of the current feeling in a feeling generation means, The control means which performs predetermined control processing for making action discover based on the parameter which changed was

established. Consequently, with this robot equipment, the same action can also attach change according to the condition of the feeling at that time, and that much small number of actions can perform a various and direct feeling expression.
[0009] moreover, the 1st step which memorizes the predetermined parameter which specifies the content of action in the control approach of robot equipment in this invention and the exterior -- and -- or, while generating feeling according to an internal situation The 2nd step to which the parameter of action is changed according to the condition of current feeling, and the 3rd step which makes robot equipment discover action based on the changed parameter concerned were prepared. Consequently, according to the control approach of this robot equipment, the same action can also attach change according to the condition of the feeling at that time, and a various and direct feeling expression can be performed with that much small number of actions.
[0010] A feeling generation means to generate feeling in robot equipment in this invention furthermore, It opts for action based on the condition of the current feeling in a storage means to memorize the predetermined parameter which specified the content of action, and a feeling generation means. The control means which performs predetermined control processing for making the action concerned discover based on the parameter of the action concerned for which it opted, and a change means to change the condition of the feeling in a feeling generation means based on the parameter of the discovered action were established. Action can be made to reflect in the condition of feeling directly with this robot equipment as a result.
[0011] Furthermore, in this invention, in the control approach of robot equipment, while generating feeling according to the situation of the 1st step which memorizes the predetermined parameter which specified the content of action, and the exterior and the interior It opts for action based on the condition of current feeling, and the 2nd step which makes robot equipment discover the action concerned based on the parameter of the action concerned for which it opted, and the 3rd step to which the condition of feeling is changed based on the parameter of the discovered action were prepared. According to the control approach of this robot equipment, action can be made to reflect in the condition of feeling directly as a result.
[0012]
[Embodiment of the Invention] About a drawing, the gestalt of 1 operation of this invention is explained in full detail below.
[0013] (1) In a robot's whole configuration (1-1) robot block diagram 1 and drawing 2 by the gestalt of this operation While the robot of the 2-pair-of-shoes walk mold by the gestalt of this operation is shown as a whole and the head unit 3 is arranged in the upper part of the idiosoma unit 2, 1 It is constituted by arranging the arm units 4A and 4B of the respectively same configuration as up right and left of the idiosoma unit 2 concerned, respectively, and attaching the leg units 5A and 5B of the respectively same configuration as the lower left right of the idiosoma unit 2 in a predetermined location, respectively.
[0014] It is constituted when the waist base 11 which forms the frame 10 which forms the truncus upper part, and a lower trunk in the idiosoma unit 2 connects through the waist joint device 12. It is made as [rotate / around the roll axes 13 which are shown in drawing 3 and which intersect perpendicularly, and a pitch axis 14 /, respectively / the truncus upper part / independently] by driving each actuators A1 and A2 of the waist joint device 12 fixed to the waist base 11 of a lower trunk, respectively.

[0015] Moreover, the head unit 3 is attached in the top-face center section of the shoulder base 15 fixed to the upper bed of a frame 10 through the neck joint device 16, and is made as [make / it / to rotate independently, respectively around the pitch axis 17 which is shown in drawing 3 and which intersects perpendicularly, and a yaw sxis 18] by driving each actuator A3 of the neck joint device 16 concerned, and A4, respectively.
[0016] Furthermore, each arm units 4A and 4B are attached in right and left of the shoulder base 15 through the shoulder-joint device 19, respectively, and are made as [make / it / to rotate independently, respectively around each corresponding actuator A5 of the shoulder-joint device 19, the pitch axis 20 which is shown in drawing 3 by driving A6, respectively and which intersects perpendicularly, and roll axes 21].
[0017] In this case, the actuator A8 which forms the forearm section in the output shaft of the actuator A7 which forms the overarm section, respectively through the elbow-joint device 22 is connected, and each arm units 4A and 4B are constituted by attaching a hand part 23 at the head of the forearm section concerned.
[0018] And in each arm units 4A and 4B, it is made by driving an actuator A7 as [make / it can be made to be able to rotate around the yaw sxis 24 which shows the forearm section to drawing 3 , and / it / to rotate, respectively around the pitch axis 25 which shows the forearm section to drawing 3 by driving an actuator A8].
[0019] on the other hand, each actuator of the hip joint device 26 which is attached in the waist base 11 of a lower trunk through the hip joint device 26, respectively, and corresponds in each leg units 5A and 5B, respectively -- A9-A11 -- it is made by driving, respectively as [make / it / to rotate independently, respectively around the yaw sxis 27 which intersects perpendicularly mutually and roll axes 28 which are shown in drawing 3 , and a pitch axis 29].
[0020] In this case, each leg units 5A and 5B are constituted by connecting a foot 34 with the soffit of the frame 32 concerned through the ankle joint device 33 while the frame 32 which forms the leg section in the soffit of the frame 30 which forms a femoral region, respectively through the knee-joint device 31 is connected.
[0021] This sets to each leg units 5A and 5B. By driving the actuator A12 which forms the knee-joint device 31 By being able to make it rotate around the pitch axis 35 which shows the leg section to drawing 3 , and driving the actuators A13 and A14 of the ankle joint device 33, respectively It is made as [make / it / to rotate independently, respectively around the pitch axis 36 which shows a foot 34 to drawing 3 and which intersects perpendicularly, and roll axes 37].
[0022] On the other hand, as shown in drawing 4 , the Maine control section 40 which manages the motion control of the robot 1 whole concerned, the circumference circuits 41, such as a power circuit and a communication circuit, and the control unit 42 with which a box comes to contain a dc-battery 45 (drawing 5) etc. are arranged in the tooth-back side of the waist base 11 which forms the lower trunk of the idiosoma unit 2.
[0023] And it connects with each sub control sections 43A-43D arranged, respectively in each configuration unit (the idiosoma unit 2, the head unit 3, each arm units 4A and 4B, and each leg units 5A and 5B), and this control unit 42 is made as [communicate / required supply voltage can be supplied or / with these sub control sections 43A-43D / it / to these sub control sections 43A-43D,].
[0024] Moreover, it connects with each actuators A1-A14 in the configuration unit which corresponds, respectively, and each sub control sections 43A-43D are made as [drive / it

/ in the condition of having been specified based on the various control command to which each actuators A1-A14 in the configuration unit concerned are given from the Maine control section 40].

[0025] The external sensor section 53 which consists of a microphone 51, a touch sensor 52, etc. which furthermore function on the head unit 3 as the CCD (Charge Coupled Device) camera 50 which functions as this robot's 1 "eyes", and a "lug" as shown in drawing 5 , The loudspeaker 54 which functions as "opening" is arranged in a predetermined location, respectively, and the internal sensor section 57 which consists of a dc-battery sensor 55, an acceleration sensor 56, etc. is arranged in the control unit 42.

[0026] And while CCD camera 50 of the external sensor section 53 picturizes a surrounding situation and obtained picture signal S1A is sent out to the Maine control section, a microphone 51 collects various instruction voice given as voice input from a user, such as "walk", "lie down", or "pursue a ball", and is made as [send / to the Maine control section 40 / sound signal S1B obtained in this way].

[0027] Moreover, in drawing 1 and drawing 2 , the touch sensor 52 is formed in the upper part of the head unit 3 so that clearly, it detects a carrier beam pressure by "it strokes" and the physical influence of "striking" from a user, and sends out a detection result to the Maine control section 40 as pressure detecting-signal S1C.

[0028] Furthermore, while the dc-battery sensor 55 of the internal sensor section 57 detects the energy residue of a dc-battery 45 a predetermined period and sends out a detection result to the Maine control section 40 as dc-battery residue detecting-signal S2A, an acceleration sensor 56 detects the acceleration of 3 shaft orientations (a x axis, y-axis, and z-axis) a predetermined period, and it sends out a detection result to the Maine control section 40 as an acceleration detecting-signal S2B.

[0029] Picture signal S1A to which the Maine control-section section 40 is supplied, respectively from CCD camera 50, the microphone 51, and touch sensor 52 grade of the external sensor section 53, Sound signal S1B, pressure detecting-signal S1C (these are hereafter called collectively the external sensor signal S1), etc., Dc-battery residue detecting-signal S2A, acceleration detecting-signal S2B, etc. which are supplied, respectively from the dc-battery sensor 55, an acceleration sensor, etc. of the internal sensor section 57 It is based on (these are hereafter called collectively the internal sensor signal S2), and a robot's 1 perimeter and an internal situation, the existence of the command from a user and the influence from a user, etc. are judged.

[0030] And the Maine control section 40 opts for the action which continues based on this decision result, the control program beforehand stored in internal-memory 40A, and the various control parameters stored in the external memory 58 with which it is then loaded, and sends out the control command based on a decision result to the corresponding sub control sections 43A-43D. Consequently, based on this control command, the actuators A1-A14 corresponding to the basis of control of those sub control sections 43A-43D drive, will make the head unit 3 rock vertically and horizontally in this way, the arm units 4A and 4B will be raised upwards, or action of walking will be discovered by the robot 1.

[0031] Moreover, the Maine control section 40 blinks this by making the voice based on the sound signal S3 concerned output outside, or outputting a driving signal to LED prepared in the predetermined location of the head unit 3 which functions as a "eye" on appearance by giving the predetermined sound signal S3 to a loudspeaker 54 if needed in

this case.
[0032] Thus, in this robot 1, it is made as [act / based on the situation of a perimeter and the interior, the existence of the command from a user, and influence, etc. / it / autonomously].
[0033] (1-2) processing of the Maine control section 40 -- here explains processing of the Maine control section 40 about such a robot's 1 action generation.
[0034] If the content of processing of the Maine control section 40 about a robot's 1 action generation is functionally classified as shown in drawing 6 The external information attaching part 60 holding the external information for choosing the next action from the external sensor section 53 (drawing 5) and the internal sensor section 57 (drawing 5) based on the external sensor signal S1 and the internal sensor signal S2 which are supplied, respectively, The instinct and the feeling generation section 61 which generates a robot's 1 instinct and feeling based on the external sensor signal S1 and internal sensor signal S2 grade, It can divide into the action decision section 62 which opts for the next action based on the instinct of the external information held by the external information attaching part 60 and the robot 1 at that time, and the condition of feeling, and the action generation section 63 which makes a robot 1 discover action actually based on the decision result of the action decision section 62. Hereafter, processing of these condition recognition section 60, instinct and the feeling generation section 61, the action decision section 62, and the action generation section 63 is explained.
[0035] (1-2-1) The processing external information attaching part 60 of the external information attaching part 60 was made to correspond to all actions that can discover a robot 1, respectively, and has memorized counted value to external memory 58.
[0036] And while the external information attaching part 60 recognizes the condition of the exterior and the interior based on the external sensor signal S1 and the internal sensor signal S2 which are given, respectively from the external sensor section 53 and the internal sensor section 57 It is based on this recognition result, and the external sensor signal S1 and the internal sensor signal S2. The inside of the counted value corresponding to the various actions held in this external memory 58, As a robot 1 makes the action considered to have been suitable as what is discovered next, and corresponding counted value increase and decreases the other action and corresponding counted value if needed to the situation of the exterior at that time, and the interior, the candidate of the next action is shown.
[0037] The external information attaching part 60 monitors continuously picture signal S1A (drawing 5) given from CCD camera 50 (drawing 5) of the external sensor section 53, when "a red round-head potato" detects "a large thing" in the image based on the picture signal S1A concerned, it recognizes it as "A ball is in near", and it makes the counted value corresponding to the action of "kicking a ball" increase concretely.
[0038] Moreover, the external information attaching part 60 makes the counted value of the action of "laughing" increase, when it recognizes that the action command with the voice "laugh" was given based on sound signal S1B (drawing 5) given from the microphone 51 (drawing 5) of the external sensor section 53.
[0039] (1-2-2) The processing instinct and the feeling generation section 61 of instinct and the feeling generation section 61 consist of instinct generation section 61A and feeling generation section 61B.

[0040] In this case, instinct generation section 61A holds eight parameters with which the strength of that gage is expressed for every gages of these about eight gages with which "nourishment (Nourishment)", "stools (Movement)", "moisture (Moisture)", "urine (Urine)", "fatigue (Tiredness)", "love (Affection)", "interest (Curiosity)", and "sleepiness (Sleepy)" carried out mutually-independent.
[0041] And instinct generation section 61A carries out renewal of sequential of the parameter value of each [these] gage a predetermined period based on the specific exterior or the specific internal situation matched with the gage detected based on the external sensor signal S1 and the internal sensor signal S2, respectively, the elapsed time from a predetermined event, etc.
[0042] For example, about the gage of "nourishment", based on dc-battery residue signal S2A (drawing 5) given from the dc-battery sensor 55 (drawing 5), instinct generation section 61A carries out renewal of sequential of the parameter value a predetermined period so that there are few energy residues of a dc-battery 45 (drawing 5), and the value may decrease. Moreover, about the gage of "stools" and "urine", renewal of sequential of the parameter value is carried out a predetermined period so that it may become large periodically based on the elapsed time after a dc-battery 45 is charged etc.
[0043] Instinct generation section 61A is made to be the same as that of the parameter of each gage. Moreover, "food intake avarice (Hunger)", "Defecation avarice (Defecation)", "water intake avarice (Thirst)", "Urination avarice (Urination)", "motion avarice (Exercise)", The parameter with which the strength of the desire is expressed for these the desires of every is held about eight desires of "love avarice (Affection)", "curiosity (Curiosity)", and "sleep avarice (Sleepy)" which carried out mutually-independent.
[0044] And instinct generation section 61A carries out renewal of sequential a predetermined period based on the magnitude of the parameter value of the gage with which it corresponds of the eight gages which mentioned above the parameter value of each [these] desire, respectively, the elapsed time from a predetermined event, etc.
[0045] For example, about desire of "food intake avarice", it carries out [, so that the parameter value concerned becomes small based on the elapsed time after charging a dc-battery 45 at the parameter value and the last of "nourishment" etc., and] renewal of sequential of the parameter value a predetermined period so that elapsed time of instinct generation section 61A increases, and the value may become large.
[0046] Moreover, about desire of "defecation avarice", based on the parameter value of "defecation avarice" and "urination avarice", instinct generation section 61A carries out renewal of sequential of the parameter value a predetermined period so that such parameter value becomes large, and the value may become large.
[0047] On the other hand, feeling generation section 61B holds a robot's 1 feeling as a coordinate of one point (this point is hereafter called the feeling point P1) in the feeling space 70 which is the three-dimension space which is centered on "the degree of **", "reliability", and "vigilance", respectively, as shown in drawing 7 . It is the parameter with which "the degree of **" shows the degree of whether it has occurred or to sleep as which the degree which can recognize that to which the current robot 1 is observing the degree of for which instinct is fulfilled and "reliability" with firm belief, and "vigilance" are determined by biorhythm which exists in a living thing, respectively here.
[0048] This feeling space 70 responds to each value of "the degree of **", "reliability", and "vigilance". And some space field 70A beforehand, It is divided into 70B.... to each [

these] space field 70A and 70B.., respectively "Joy (Joy)", "fear (Fear)" and "the resentment (Anger)" -- "-- feeling sad (Sadness) -- " -- "-- surprised (Surprise) -- " -- and mutually different emotions, such as "dislike (Hatred) etc.", are matched.

[0049] In this way, for feeling generation section 61B, it sets to this feeling space 70, and the feeling points P1 are which space fields 70A and 70B.... by whether it is inside While determining the feeling of the robot 1 at that time as the emotion matched with space field 70A to which the feeling point P1 belongs then, and 70B...., they are the space fields 70A and 70B from the feeling point concerned.. The distance to a core is determined as strength of the emotion.

[0050] Furthermore, although the value, the variation and time amount, and the robot 1 of parameter value of each desire held at instinct generation section 61A are looking at feeling generation section 61B, it changes the parameter value of "the degree of **", "reliability", and "vigilance" based on the degree of recognition etc., and thereby, it changes a robot's 1 feeling.

[0051] Feeling generation section 61B makes parameter value fluctuate about "the degree of **" in practice according to the variation, when the parameter value of either of each desire of the "food intake avarice" in instinct generation section 61A, "defecation avarice", "water intake avarice", "urination avarice", "motion avarice", "love avarice", "curiosity", and "sleep avarice" changes.

[0052] For example, when the parameter value of "defecation avarice" decreases, as it is shown in drawing 8 (A), when the parameter value of "the degree of **" is made to increase according to the variation and the parameter value of "food intake avarice" increases, feeling generation section 61B decreases the parameter value of "the degree of **" according to the variation, as shown in drawing 8 (B).

[0053] In addition, it is beforehand defined for every desire, respectively whether the parameter value of "the degree of **" is made to increase to the increment in the parameter value of desire, it is made to decrease, or how many parameter value of "the degree of **" are changed to the variation of the parameter value of desire.

[0054] Moreover, feeling generation section 61B makes parameter value fluctuate about "reliability" based on the degree (for example, whenever [matching]) of recognition to what the robot 1 is seeing then etc., and makes the parameter value fluctuate about "vigilance" based on magnitude, time amount which has occurred of parameter value of the "sleep avarice" held at instinct generation section 61A.

[0055] Space field 70A to which is attained to or the feeling point P1 concerned belongs from the feeling point P1 as a result by migration of the feeling point P1 in such "a degree of **", and "reliability" feeling space 70 accompanying the change in "vigilance", space fields 70A and 70B of 70B.... where the distance and the feeling point P1 to a core belong .. The very thing changes.

[0056] Thus, in feeling generation section 61B, a robot's 1 feeling is generated so that the condition may be changed according to the variation of the parameter value of each desire in instinct generation section 61A etc.

[0057] (1-2-3) The processing action decision section 62 of the action decision section 62 The counted value for every action currently held at the external information attaching part 60, Based on the condition (the class and its strength of an emotion) of the feeling at that time in feeling generation section 61B, the next action is determined as the magnitude list of the parameter value of each desire which instinct generation section

61A holds in instinct and the feeling generation section 61. It notifies to the action generation section 63 by making a decision result into the action decision information D2.

[0058] For example, when the action generation section 62 has the large counted value corresponding to the action which is near the robot 1 in the external information attaching part 60 of "kicking a ball", The parameter value of the "motion avarice" which instinct generation section 61A of instinct and the feeling generation section 61 holds is large, and the feeling condition of the robot 1 at that time in feeling generation section 61B opts for the action which starts with "it is glad" when the strength is large of "kicking a ball" as next action.

[0059] On the other hand, the action generation section 62 has the small parameter value of the "motion avarice" which instinct generation section 61A at that time holds, and is determined as other actions except the feeling condition of the robot 1 at that time in feeling generation section 61B "kicking a ball" as next action by "dislike", when the strength is large.

[0060] (1-2-4) In the processing action generation section 63 of the action generation section 63, if the action decision information D2 is given from the action decision section 62, control command COM for making a robot discover the action based on the action decision information D2 concerned will be generated, and this will be outputted to the corresponding sub control sections 43A-43D, respectively.

[0061] The action generation section 63 is made to correspond to each action of "he walks", "it sitting down", "dancing", etc. concretely, respectively. In order to make a robot 1 discover the action, the output shaft of which actuators A1-A14 (drawing 1 and drawing 2) was referred to as whether to carry out revolution actuation only of what include angle to which timing. It has the file (this is hereafter called an action file) which specified the serial content of control of each actuators A1-A14 for every action in external memory 58 (drawing 5).

[0062] And whenever the action decision information D2 is given from the action decision section 62, the action generation section 63 generates control command COM based on the control parameter which carried out sequential playback of the corresponding action file, and was stored in the action file concerned, and sends it out to the sub control sections 43A-43D which correspond the control command COM concerned.

[0063] Sequential actuation of the actuators A1-A14 which correspond by the sub control sections 43A-43D which correspond based on this control command COM as a result will be carried out, and the action which applies a robot 1 in this way will be discovered.

[0064] Thus, in the Maine control section 40, it is made as [make / a robot 1 / to act autonomously according to the situation of the exterior and the interior, the existence of the command from a user, and influence, etc.].

[0065] (2) Explain action and the modulation of feeling, next the action which is this robot's 1 characteristic configuration and the modulation (modulation) of feeling.

[0066] (2-1) In the case of the robot 1 of modulation ** of the action based on feeling It is made to face the action for which the action decision section 62 opted as mentioned above that a robot 1 is discovered. A "rate" rate ["periodicity" of the action in the action file to which the action generation section 63 corresponds, and] by reaching or carrying out modulation processing of the control parameter about the "amplitude" according to

the condition of the feeling of the robot 1 at that time It is made as [make / the condition of the feeling concerned / to reflect in action directly].
[0067] In practice, in the case of this robot 1, in each action file stored in external memory 58 as mentioned above, the modulation propriety information which shows whether it can modulate, respectively is stored about "periodicity", a "rate", and the "amplitude" of that action, respectively.
[0068] And if the next action is notified as action decision information D2 from the action decision section 62, the action generation section 63 The action file which corresponds from external memory 58 is read, and it is based on the modulation propriety information stored in the action file concerned. "Periodicity", a "rate" -- and -- "-- the propriety of modulation being judged to every amplitude", and, in being the action which cannot carry out modulation of the all Control command COM based on the control parameter stored in the action file concerned as mentioned above is generated, and the control command COM concerned is sent out to the corresponding sub control sections 43A-43D.
[0069] On the other hand, when the "periodicity" or of the action, "a rate" or, and the "amplitude" can be modulated, the action generation section 63 carries out modulation processing of the action concerned so that the condition of the feeling at that time in feeling generation section 61B of instinct and the feeling generation section 61 may be made to reflect.
[0070] The "degree of **" of the feeling space [in / as the action generation section 63 is concretely shown in drawing 9 / feeling generation section 61B] 70, The "periodicity" matched with each shaft of "reliability" and "vigilance", respectively, The action space 71 which is the three-dimension space specified with three shafts of a "rate" and the "amplitude" is defined, and the coordinate of the feeling point P1 in the feeling space 70 is mapped by the predetermined matching ratio in the action space 71 concerned.
[0071] In this case, can set up this matching ratio freely, for example, when the ratio between 1:3, "vigilance", and the "amplitude" is set [the ratio between the "degree of **", and "periodicity"] up for the ratio between 1:1, "reliability", and a "rate" with 2:3, it sets. feeling -- space -- 70 -- it can set -- feeling -- a point -- P -- one -- a coordinate ([the degree of **, reliability, vigilance]) -- [-- 50 -- 50,100 --] -- it was -- the time -- **** -- action space -- 71 -- mapping -- having had -- the back -- feeling -- a point -- P -- one -- ' -- a coordinate (= [periodicity, a rate, and the amplitude]) -- [50,150,150] -- becoming .
[0072] And the "periodicity" of feeling point P1' after mapping obtained by carrying out the action generation section 63 in this way, It is based on each coordinate of a "rate" and the "amplitude". "Periodicity" of the action, As opposed to "periodicity" of the action about the thing in which modulation of a "rate" and the "amplitude" is possible The coordinate of "periodicity" of feeling point P1' after mapping, As opposed to the "rate" of action The coordinate of the "rate" of feeling point P1' after mapping, So that the parameter value of "periodicity" and the "rate" as which the action was beforehand specified to the "amplitude" of action by the percentage of the value of the coordinate of the "amplitude" of feeling point P1' after mapping, or the "amplitude" may be made to increase Modulation processing of the control parameter to which it corresponds in the action file which specified the action is carried out.
[0073] It can follow, for example, all "periodicity" of the action, the "rates", and "amplitude" can be mapped. When the coordinate of "periodicity" of feeling point P1'

after mapping in action space 71, a "rate", and the "amplitude" is [50,150,150] So that the increment in 50 [%] of is done to regular "periodicity", a "rate" may do the increment in 150 [%] of to regular "rate" and "periodicity" of the action may do the increment of the "amplitude" in 150 [%] to regular "amplitude" Modulation processing of the control parameter to which a corresponding action file corresponds is carried out.

[0074] The action generation section 63 makes a robot 1 discover the action based on the control command COM concerned in this way by generating control command COM based on the control parameter obtained by doing in this way after this, and sending out the control command COM concerned to the corresponding sub control sections 43A-43D.

[0075] Thus, in this robot 11, it is made as [make / the condition of the feeling at that time / to reflect in action].

[0076] (2-2) In modulation one side of the feeling based on action, and this robot 1, when discovering the action specified with the instruction from the outside, it is made as [make / this / to reflect in a robot's 1 feeling].

[0077] In practice, the action decision section 63 notifies this to instinct, the feeling generation section 61, and the action generation section 63, when it opts for the action specified with the instruction from the outside as next action.

[0078] At this time, the action generation section 63 reads the action file of this action for which it opted from external memory 58, generates control command COM based on the control parameter stored in the action file concerned, and sends out the control command COM concerned to the corresponding sub control sections 43A-43D. As a result based on this control command, that action is discovered by the robot.

[0079] Moreover, the action generation section 63 gives the control parameter about "periodicity", a "rate", and the "amplitude" of the action concerned stored in the action file of the action with this to instinct and the feeling generation section 61. For example, when this action is "laughing", the control parameter concerning ["periodicity" of the action and spacing of a sound] the "rate" of the action and the magnitude of a laughing voice in the control parameter about the conformity of spacing of a sound is given to instinct and the feeling generation section 61 as a control parameter about the "amplitude" of the action among the control parameters about the laughing voice "********** ...." stored in the action file.

[0080] At this time, feeling generation section 61B of instinct and the feeling generation section 61 "Periodicity" of the action given from the action generation section 63 as shown in drawing 10 , While plotting the point (this is hereafter called the acting point P2) which makes parameter value of the control parameter of a "rate" and the "amplitude" the coordinate of "periodicity", a "rate", and the "amplitude", respectively on the above-mentioned action space 71 The acting point P2 is mapped by the predetermined matching ratio to the above-mentioned feeling space 70.

[0081] In this case, can set up this matching ratio freely, for example, when the ratio between 2:3, the "amplitude", and "vigilance" is set [the ratio between "periodicity" and the "degree of **"] up for the ratio between 1:1, a "rate", and "reliability" with 1:1, it sets. When the coordinates of the acting point P2 in action space 71 are [50, 10, 50], the coordinate after the acting point P2 concerned was mapped by the feeling space 70 is set to [50, 15, 50].

[0082] And the coordinate of acting point P2' after mapping obtained by carrying out

feeling generation section 61B in this way, difference with the coordinate of the present feeling point (not shown in drawing 10) -- "the degree of **", and "reliability" -- and -- "-- for every vigilance", referring to the duration time The parameter value of the control parameter of the "degree of **" of the feeling point currently then held, "reliability", and "vigilance" is changed so that it may bring close to the coordinate of acting point P2' after mapping the coordinate of a current feeling point gradually.

[0083] Thus, in this robot 1, it is made as [make / self action / to reflect in the condition of the feeling at that time].

[0084] (2-3) In modulation another side of the feeling based on external information, and this robot 1, it is made as [make / the stimulus from the outside / reflect in self feeling].

[0085] It sets in practice to feeling generation section 61B of instinct and the feeling generation section 61. It is based on sound signal S1B (drawing 5) supplied from picture signal S1A (drawing 5) supplied from CCD camera 50 (drawing 5), or a microphone 51 (drawing 5). For example, recognition of an input with periodicity, such as light which blinks periodically, and music, detects "periodicity", a "rate", and the "amplitude" as characteristic quantity of the input concerned.

[0086] For example, when the applied periodic input is the flash of light, feeling generation section 61B detects the time amount of one burning as a "rate", and detects a brightness difference the brightest time at the time of a flash, and when dark as "amplitude" further while it detects the period of the flash as "periodicity." moreover -- the case where the periodic input which feeling generation section 61B requires is music -- the sound -- while detecting an easy rhythm as "periodicity" -- the sound -- easy Il Tempo -- as a "rate" -- detecting -- further -- the sound -- an easy loudness level is detected as "amplitude."

[0087] And feeling generation section 61B maps the point P3 detecting [external input] by the predetermined matching ratio to the feeling space 70 while plotting the point (this is hereafter called the point P3 detecting [external input]) which makes the value of "periodicity" of the input which carried out in this way and was detected, a "rate", and the "amplitude" the coordinate of "periodicity", a "rate", and the "amplitude", respectively on the above-mentioned action space 71, as shown in drawing 11 .

[0088] Also in this case, this matching ratio can be set up freely. For example, when the ratio between 1:3, the "amplitude", and "vigilance" is set [the ratio between "periodicity" and the "degree of **"] up for the ratio between 1:1, a "rate", and "reliability" with 2:3, it sets. When the coordinates of the point P3 in action space 71 detecting [external input] are [50, 10, 50], the coordinate after the point P3 concerned detecting [external input] was mapped by the feeling space 70 is set to [50, 30, 75].

[0089] And the coordinate of detecting [external input] point P3' after mapping obtained by carrying out feeling generation section 61B in this way, difference with the coordinate of the present feeling point (not shown in drawing 11) -- "the degree of **", and "reliability" -- and -- "-- for every vigilance", referring to the duration time The parameter value of the "degree of **" of the feeling point currently then held, "reliability", and "vigilance" is updated so that it may bring close to the coordinate of detecting [external input] point P3' after mapping the coordinate of a current feeling point gradually.

[0090] Thus, in this robot 1, it is made as [make / self feeling / change according to an external input with periodicity].

[0091] In actuation of the gestalt of this operation, and the configuration beyond

effectiveness (3) This robot 1 The coordinate of the feeling point P1 of expressing the current robot's 1 feeling in the feeling space 70 is changed into the coordinate on action space 71. While changing the control parameter about "periodicity", a "rate", and the "amplitude" of the next action based on the coordinate after the conversion concerned and expressing the discovered action as a coordinate on action space 71 The coordinate concerned is changed into the coordinate on the feeling space 70, and the control parameter about the "degree of **" of current feeling in the feeling space 70, "reliability", and "vigilance" is changed based on the coordinate after the conversion concerned.
[0092] Therefore, the same action can also attach change according to the condition of the feeling at that time, and this robot 1 can perform a various and direct feeling expression with that much small number of actions. Moreover, this robot 1 can make action reflect in the condition of feeling directly.
[0093] According to the above configuration, the coordinate of the feeling point P1 of expressing the current robot's 1 feeling in the feeling space 70 is changed into the coordinate on action space 71. By having made it change the control parameter about "periodicity", a "rate", and the "amplitude" of the next action based on the coordinate after the conversion concerned The same action can also attach change according to the condition of the feeling at that time, a various and direct feeling expression can be performed with that much small number of actions, and the high robot equipment of entertainment nature can be realized in this way.
[0094] Moreover, while expressing the discovered action as a coordinate on action space 71 By changing the coordinate concerned into the coordinate on the feeling space 70, and having made it change the control parameter about the "degree of **" of current feeling in the feeling space 70, "reliability", and "vigilance" based on the coordinate after the conversion concerned Action can be made to be able to reflect in the condition of feeling directly, and entertainment nature can be raised also by this.
[0095] (4) it is the gestalt of other operations -- although the case where this invention was applied to the robot 1 of the 2-pair-of-shoes walk mold constituted like drawing 1 and drawing 2 in the gestalt of above-mentioned operation was described -- this invention -- not only this -- in addition, it is widely applicable to the robot equipment of various gestalten.
[0096] Moreover, although the case where the feeling space 70 and action space 71 were defined as coordinate space of a three dimension was described, you may make it define this invention in the gestalt of above-mentioned operation as coordinate space-dimensional [two or more] not only this but other than this.
[0097] Furthermore, in the gestalt of above-mentioned operation, although only the case which carries out modulation processing of "periodicity", a "rate", and the "amplitude" of action was described based on the condition of current feeling You may make it operate this invention so that configuration parts, such as the head unit 3 which is not used not only this but in case it performs the action, for example in addition to this, and each arm units 4A and 4B, each leg units 5A and 5B, may be moved according to the condition of the feeling at that time.
[0098] The control data which specified various actuation ("its head is hung in the head" etc. when sad), respectively is stored in external memory 58. in this case -- about the configuration section made to specialize in various emotions, like "it is glad" beforehand, respectively -- ** -- The control parameter of "periodicity" of this action by which

modulation processing was carried out, a "rate", and the "amplitude", By generating control command COM based on the control data of operation suitable for the current robot's 1 feeling, and sending out the control command COM concerned to the corresponding sub control sections 43A-43D What is necessary is making it just make a robot 1 discover the action based on the control command COM concerned, and this actuation.

[0099] You may make it change the control parameter about "periodicity", a "rate", and the "amplitude" of the actuation which starts further the same with furthermore having mentioned above about drawing 9 in this case.

[0100]

[Effect of the Invention] according to this invention as mentioned above -- robot equipment -- setting -- the exterior -- and -- or with a feeling generation means to generate feeling according to an internal situation A storage means to memorize the predetermined parameter which specifies the content of action, and a change means to change the parameter of action according to the condition of the current feeling in a feeling generation means, By having established the control means which performs predetermined control processing for making action discover based on the parameter which changed The same action can also attach change according to the condition of the feeling at that time, a various and direct feeling expression can be performed with that much small number of actions, and the high robot equipment of entertainment nature can be realized in this way.

[0101] moreover, the 1st step which memorizes the predetermined parameter which specifies the content of action in the control approach of robot equipment according to this invention and the exterior -- and -- or, while generating feeling according to an internal situation By having prepared the 2nd step to which the parameter of action is changed according to the condition of current feeling, and the 3rd step which makes robot equipment discover action based on the changed parameter concerned The same action can also attach change according to the condition of the feeling at that time, a various and direct feeling expression can be performed with that much small number of actions, and the control approach of the high robot equipment of entertainment nature can be realized in this way.

[0102] A feeling generation means to generate feeling in robot equipment furthermore according to this invention, It opts for action based on the condition of the current feeling in a storage means to memorize the predetermined parameter which specified the content of action, and a feeling generation means. The control means which performs predetermined control processing for making the action concerned discover based on the parameter of the action concerned for which it opted, By having established a change means to change the condition of the feeling in a feeling generation means based on the parameter of the discovered action, action can be made to reflect in the condition of feeling directly, and the high robot equipment of entertainment nature can be realized in this way.

[0103] Furthermore, in this invention, in the control approach of robot equipment, while generating feeling according to the situation of the 1st step which memorizes the predetermined parameter which specified the content of action, and the exterior and the interior The 2nd step which it opts [step] for action based on the condition of current feeling, and makes robot equipment discover the action concerned based on the

parameter of the action concerned for which it opted, By having prepared the 3rd step to which the condition of feeling is changed based on the parameter of the discovered action, action can be made to reflect in the condition of feeling directly, and the control approach of the high robot equipment of entertainment nature can be realized in this way.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention is applied to a robot with feeling, concerning robot equipment and its control approach, and is suitable.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] In recent years, the robot of a 4-piece walk mold is developed and sold by this application applicant for a patent. This robot has an appearance configuration similar to the dog bred at ordinary homes, or a cat, generates self feeling according to "it strikes", the influence from the user of "stroking", a surrounding environment, etc., and he is made as [act / it / autonomously], considering the condition of the feeling concerned.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] according to this invention as mentioned above -- robot equipment -- setting -- the exterior -- and -- or with a feeling generation means to generate feeling according to an internal situation A storage means to memorize the predetermined parameter which specifies the content of action, and a change means to change the parameter of action according to the condition of the current feeling in a feeling generation means, By having established the control means which performs predetermined control processing for making action discover based on the parameter which changed The same action can also attach change according to the condition of the feeling at that time, a various and direct feeling expression can be performed with that much small number of actions, and the high robot equipment of entertainment nature can be realized in this way.
[0101] moreover, the 1st step which memorizes the predetermined parameter which specifies the content of action in the control approach of robot equipment according to this invention and the exterior -- and -- or, while generating feeling according to an internal situation By having prepared the 2nd step to which the parameter of action is changed according to the condition of current feeling, and the 3rd step which makes robot equipment discover action based on the changed parameter concerned The same action can also attach change according to the condition of the feeling at that time, a various and direct feeling expression can be performed with that much small number of actions, and the control approach of the high robot equipment of entertainment nature can be realized in this way.
[0102] A feeling generation means to generate feeling in robot equipment furthermore according to this invention, It opts for action based on the condition of the current feeling in a storage means to memorize the predetermined parameter which specified the content of action, and a feeling generation means. The control means which performs predetermined control processing for making the action concerned discover based on the parameter of the action concerned for which it opted, By having established a change means to change the condition of the feeling in a feeling generation means based on the parameter of the discovered action, action can be made to reflect in the condition of feeling directly, and the high robot equipment of entertainment nature can be realized in this way.
[0103] Furthermore, in this invention, in the control approach of robot equipment, while generating feeling according to the situation of the 1st step which memorizes the predetermined parameter which specified the content of action, and the exterior and the

interior The 2nd step which it opts [step] for action based on the condition of current feeling, and makes robot equipment discover the action concerned based on the parameter of the action concerned for which it opted, By having prepared the 3rd step to which the condition of feeling is changed based on the parameter of the discovered action, action can be made to reflect in the condition of feeling directly, and the control approach of the high robot equipment of entertainment nature can be realized in this way.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, in this conventional robot, considering self feeling as mentioned above, as an approach that it may be made to make it act autonomously, two or more actions are beforehand prepared for every condition of feeling, respectively, and in case feeling is expressed, the approach of choosing one action from corresponding actions and discovering this is used.

[0004] For example, when the value of the parameter showing a certain feeling was 50, the action "A", "B", and "C" was prepared, and when the value of the parameter concerned was 80, some actions were prepared for condition of preparing the action "D", "E", and "F" in which the content of action completely differs from "A" - "C" to the condition of various feeling, respectively.

[0005] However, since according to this approach the part and development which need to prepare two or more actions for every condition of each feeling, respectively made it complicated and what has a big capacity as memory for holding the control parameter which specifies the various contents of action in the interior of a robot was needed, the number of actions which can be prepared was limited and there was a problem which cannot perform sufficient feeling expression.

[0006] Therefore, if it can make it possible to perform various feeling expressions with the small number of actions, it will be thought that a robot with more high entertainment nature can be offered, aiming at lowering of cost.

[0007] This invention was made in consideration of the above point, and tends to propose the high robot equipment and its control approach of entertainment nature.

[Translation done.]

MEANS

[Means for Solving the Problem] In order to solve this technical problem, it sets to this invention. robot equipment -- setting -- the exterior -- and -- or with a feeling generation means to generate feeling according to an internal situation A storage means to memorize the predetermined parameter which specifies the content of action, and a change means to change the parameter of action according to the condition of the current feeling in a feeling generation means, The control means which performs predetermined control processing for making action discover based on the parameter which changed was established. Consequently, with this robot equipment, the same action can also attach change according to the condition of the feeling at that time, and that much small number of actions can perform a various and direct feeling expression.
[0009] moreover, the 1st step which memorizes the predetermined parameter which specifies the content of action in the control approach of robot equipment in this invention and the exterior -- and -- or, while generating feeling according to an internal situation The 2nd step to which the parameter of action is changed according to the condition of current feeling, and the 3rd step which makes robot equipment discover action based on the changed parameter concerned were prepared. Consequently, according to the control approach of this robot equipment, the same action can also attach change according to the condition of the feeling at that time, and a various and direct feeling expression can be performed with that much small number of actions.
[0010] A feeling generation means to generate feeling in robot equipment in this invention furthermore, It opts for action based on the condition of the current feeling in a storage means to memorize the predetermined parameter which specified the content of action, and a feeling generation means. The control means which performs predetermined control processing for making the action concerned discover based on the parameter of the action concerned for which it opted, and a change means to change the condition of the feeling in a feeling generation means based on the parameter of the discovered action were established. Action can be made to reflect in the condition of feeling directly with this robot equipment as a result.
[0011] Furthermore, in this invention, in the control approach of robot equipment, while generating feeling according to the situation of the 1st step which memorizes the predetermined parameter which specified the content of action, and the exterior and the interior It opts for action based on the condition of current feeling, and the 2nd step which makes robot equipment discover the action concerned based on the parameter of the action concerned for which it opted, and the 3rd step to which the condition of feeling is changed based on the parameter of the discovered action were prepared. According to

the control approach of this robot equipment, action can be made to reflect in the condition of feeling directly as a result.
[0012]
[Embodiment of the Invention] About a drawing, the gestalt of 1 operation of this invention is explained in full detail below.
[0013] (1) In a robot's whole configuration (1-1) robot block diagram 1 and drawing 2 by the gestalt of this operation While the robot of the 2-pair-of-shoes walk mold by the gestalt of this operation is shown as a whole and the head unit 3 is arranged in the upper part of the idiosoma unit 2, 1 It is constituted by arranging the arm units 4A and 4B of the respectively same configuration as up right and left of the idiosoma unit 2 concerned, respectively, and attaching the leg units 5A and 5B of the respectively same configuration as the lower left right of the idiosoma unit 2 in a predetermined location, respectively.
[0014] It is constituted when the waist base 11 which forms the frame 10 which forms the truncus upper part, and a lower trunk in the idiosoma unit 2 connects through the waist joint device 12. It is made as [rotate / around the roll axes 13 which are shown in drawing 3 and which intersect perpendicularly, and a pitch axis 14 /, respectively / the truncus upper part / independently] by driving each actuators A1 and A2 of the waist joint device 12 fixed to the waist base 11 of a lower trunk, respectively.
[0015] Moreover, the head unit 3 is attached in the top-face center section of the shoulder base 15 fixed to the upper bed of a frame 10 through the neck joint device 16, and is made as [make / it / to rotate independently, respectively around the pitch axis 17 which is shown in drawing 3 and which intersects perpendicularly, and a yaw sxis 18] by driving each actuator A3 of the neck joint device 16 concerned, and A4, respectively.
[0016] Furthermore, each arm units 4A and 4B are attached in right and left of the shoulder base 15 through the shoulder-joint device 19, respectively, and are made as [make / it / to rotate independently, respectively around each corresponding actuator A5 of the shoulder-joint device 19, the pitch axis 20 which is shown in drawing 3 by driving A6, respectively and which intersects perpendicularly, and roll axes 21].
[0017] In this case, the actuator A8 which forms the forearm section in the output shaft of the actuator A7 which forms the overarm section, respectively through the elbow-joint device 22 is connected, and each arm units 4A and 4B are constituted by attaching a hand part 23 at the head of the forearm section concerned.
[0018] And in each arm units 4A and 4B, it is made by driving an actuator A7 as [make / it can be made to be able to rotate around the yaw sxis 24 which shows the forearm section to drawing 3 , and / it / to rotate, respectively around the pitch axis 25 which shows the forearm section to drawing 3 by driving an actuator A8].
[0019] on the other hand, each actuator of the hip joint device 26 which is attached in the waist base 11 of a lower trunk through the hip joint device 26, respectively, and corresponds in each leg units 5A and 5B, respectively -- A9-A11 -- it is made by driving, respectively as [make / it / to rotate independently, respectively around the yaw sxis 27 which intersects perpendicularly mutually and roll axes 28 which are shown in drawing 3 , and a pitch axis 29].
[0020] In this case, each leg units 5A and 5B are constituted by connecting a foot 34 with the soffit of the frame 32 concerned through the ankle joint device 33 while the frame 32 which forms the leg section in the soffit of the frame 30 which forms a femoral region, respectively through the knee-joint device 31 is connected.

[0021] This sets to each leg units 5A and 5B. By driving the actuator A12 which forms the knee-joint device 31 By being able to make it rotate around the pitch axis 35 which shows the leg section to drawing 3 , and driving the actuators A13 and A14 of the ankle joint device 33, respectively It is made as [make / it / to rotate independently, respectively around the pitch axis 36 which shows a foot 34 to drawing 3 and which intersects perpendicularly, and roll axes 37].
[0022] On the other hand, as shown in drawing 4 , the Maine control section 40 which manages the motion control of the robot 1 whole concerned, the circumference circuits 41, such as a power circuit and a communication circuit, and the control unit 42 with which a box comes to contain a dc-battery 45 (drawing 5) etc. are arranged in the tooth-back side of the waist base 11 which forms the lower trunk of the idiosoma unit 2.
[0023] And it connects with each sub control sections 43A-43D arranged, respectively in each configuration unit (the idiosoma unit 2, the head unit 3, each arm units 4A and 4B, and each leg units 5A and 5B), and this control unit 42 is made as [communicate / required supply voltage can be supplied or / with these sub control sections 43A-43D / it / to these sub control sections 43A-43D,].
[0024] Moreover, it connects with each actuators A1-A14 in the configuration unit which corresponds, respectively, and each sub control sections 43A-43D are made as [drive / it / in the condition of having been specified based on the various control command to which each actuators A1-A14 in the configuration unit concerned are given from the Maine control section 40].
[0025] The external sensor section 53 which consists of a microphone 51, a touch sensor 52, etc. which furthermore function on the head unit 3 as the CCD (Charge Coupled Device) camera 50 which functions as this robot's 1 "eyes", and a "lug" as shown in drawing 5 , The loudspeaker 54 which functions as "opening" is arranged in a predetermined location, respectively, and the internal sensor section 57 which consists of a dc-battery sensor 55, an acceleration sensor 56, etc. is arranged in the control unit 42.
[0026] And while CCD camera 50 of the external sensor section 53 picturizes a surrounding situation and obtained picture signal S1A is sent out to the Maine control section, a microphone 51 collects various instruction voice given as voice input from a user, such as "walk", "lie down", or "pursue a ball", and is made as [send / to the Maine control section 40 / sound signal S1B obtained in this way].
[0027] Moreover, in drawing 1 and drawing 2 , the touch sensor 52 is formed in the upper part of the head unit 3 so that clearly, it detects a carrier beam pressure by "it strokes" and the physical influence of "striking" from a user, and sends out a detection result to the Maine control section 40 as pressure detecting-signal S1C.
[0028] Furthermore, while the dc-battery sensor 55 of the internal sensor section 57 detects the energy residue of a dc-battery 45 a predetermined period and sends out a detection result to the Maine control section 40 as dc-battery residue detecting-signal S2A, an acceleration sensor 56 detects the acceleration of 3 shaft orientations (a x axis, y-axis, and z-axis) a predetermined period, and it sends out a detection result to the Maine control section 40 as an acceleration detecting-signal S2B.
[0029] Picture signal S1A to which the Maine control-section section 40 is supplied, respectively from CCD camera 50, the microphone 51, and touch sensor 52 grade of the external sensor section 53, Sound signal S1B, pressure detecting-signal S1C (these are hereafter called collectively the external sensor signal S1), etc., Dc-battery residue

detecting-signal S2A, acceleration detecting-signal S2B, etc. which are supplied, respectively from the dc-battery sensor 55, an acceleration sensor, etc. of the internal sensor section 57 It is based on (these are hereafter called collectively the internal sensor signal S2), and a robot's 1 perimeter and an internal situation, the existence of the command from a user and the influence from a user, etc. are judged.

[0030] And the Maine control section 40 opts for the action which continues based on this decision result, the control program beforehand stored in internal-memory 40A, and the various control parameters stored in the external memory 58 with which it is then loaded, and sends out the control command based on a decision result to the corresponding sub control sections 43A-43D. Consequently, based on this control command, the actuators A1-A14 corresponding to the basis of control of those sub control sections 43A-43D drive, will make the head unit 3 rock vertically and horizontally in this way, the arm units 4A and 4B will be raised upwards, or action of walking will be discovered by the robot 1.

[0031] Moreover, the Maine control section 40 blinks this by making the voice based on the sound signal S3 concerned output outside, or outputting a driving signal to LED prepared in the predetermined location of the head unit 3 which functions as a "eye" on appearance by giving the predetermined sound signal S3 to a loudspeaker 54 if needed in this case.

[0032] Thus, in this robot 1, it is made as [act / based on the situation of a perimeter and the interior, the existence of the command from a user, and influence, etc. / it / autonomously].

[0033] (1-2) processing of the Maine control section 40 -- here explains processing of the Maine control section 40 about such a robot's 1 action generation.

[0034] If the content of processing of the Maine control section 40 about a robot's 1 action generation is functionally classified as shown in drawing 6 The external information attaching part 60 holding the external information for choosing the next action from the external sensor section 53 (drawing 5) and the internal sensor section 57 (drawing 5) based on the external sensor signal S1 and the internal sensor signal S2 which are supplied, respectively, The instinct and the feeling generation section 61 which generates a robot's 1 instinct and feeling based on the external sensor signal S1 and internal sensor signal S2 grade, It can divide into the action decision section 62 which opts for the next action based on the instinct of the external information held by the external information attaching part 60 and the robot 1 at that time, and the condition of feeling, and the action generation section 63 which makes a robot 1 discover action actually based on the decision result of the action decision section 62. Hereafter, processing of these condition recognition section 60, instinct and the feeling generation section 61, the action decision section 62, and the action generation section 63 is explained.

[0035] (1-2-1) The processing external information attaching part 60 of the external information attaching part 60 was made to correspond to all actions that can discover a robot 1, respectively, and has memorized counted value to external memory 58.

[0036] And while the external information attaching part 60 recognizes the condition of the exterior and the interior based on the external sensor signal S1 and the internal sensor signal S2 which are given, respectively from the external sensor section 53 and the internal sensor section 57 It is based on this recognition result, and the external sensor

signal S1 and the internal sensor signal S2. The inside of the counted value corresponding to the various actions held in this external memory 58, As a robot 1 makes the action considered to have been suitable as what is discovered next, and corresponding counted value increase and decreases the other action and corresponding counted value if needed to the situation of the exterior at that time, and the interior, the candidate of the next action is shown.

[0037] The external information attaching part 60 monitors continuously picture signal S1A (drawing 5) given from CCD camera 50 (drawing 5) of the external sensor section 53, when "a red round-head potato" detects "a large thing" in the image based on the picture signal S1A concerned, it recognizes it as "A ball is in near", and it makes the counted value corresponding to the action of "kicking a ball" increase concretely.

[0038] Moreover, the external information attaching part 60 makes the counted value of the action of "laughing" increase, when it recognizes that the action command with the voice "laugh" was given based on sound signal S1B (drawing 5) given from the microphone 51 (drawing 5) of the external sensor section 53.

[0039] (1-2-2) The processing instinct and the feeling generation section 61 of instinct and the feeling generation section 61 consist of instinct generation section 61A and feeling generation section 61B.

[0040] In this case, instinct generation section 61A holds eight parameters with which the strength of that gage is expressed for every gages of these about eight gages with which "nourishment (Nourishment)", "stools (Movement)", "moisture (Moisture)", "urine (Urine)", "fatigue (Tiredness)", "love (Affection)", "interest (Curiosity)", and "sleepiness (Sleepy)" carried out mutually-independent.

[0041] And instinct generation section 61A carries out renewal of sequential of the parameter value of each [these] gage a predetermined period based on the specific exterior or the specific internal situation matched with the gage detected based on the external sensor signal S1 and the internal sensor signal S2, respectively, the elapsed time from a predetermined event, etc.

[0042] For example, about the gage of "nourishment", based on dc-battery residue signal S2A (drawing 5) given from the dc-battery sensor 55 (drawing 5), instinct generation section 61A carries out renewal of sequential of the parameter value a predetermined period so that there are few energy residues of a dc-battery 45 (drawing 5), and the value may decrease. Moreover, about the gage of "stools" and "urine", renewal of sequential of the parameter value is carried out a predetermined period so that it may become large periodically based on the elapsed time after a dc-battery 45 is charged etc.

[0043] Instinct generation section 61A is made to be the same as that of the parameter of each gage. Moreover, "food intake avarice (Hunger)", "Defecation avarice (Defecation)", "water intake avarice (Thirst)", "Urination avarice (Urination)", "motion avarice (Exercise)", The parameter with which the strength of the desire is expressed for these the desires of every is held about eight desires of "love avarice (Affection)", "curiosity (Curiosity)", and "sleep avarice (Sleepy)" which carried out mutually-independent.

[0044] And instinct generation section 61A carries out renewal of sequential a predetermined period based on the magnitude of the parameter value of the gage with which it corresponds of the eight gages which mentioned above the parameter value of each [these] desire, respectively, the elapsed time from a predetermined event, etc.

[0045] For example, about desire of "food intake avarice", it carries out [, so that the

parameter value concerned becomes small based on the elapsed time after charging a dc-battery 45 at the parameter value and the last of "nourishment" etc., and] renewal of sequential of the parameter value a predetermined period so that elapsed time of instinct generation section 61A increases, and the value may become large.

[0046] Moreover, about desire of "defecation avarice", based on the parameter value of "defecation avarice" and "urination avarice", instinct generation section 61A carries out renewal of sequential of the parameter value a predetermined period so that such parameter value becomes large, and the value may become large.

[0047] On the other hand, feeling generation section 61B holds a robot's 1 feeling as a coordinate of one point (this point is hereafter called the feeling point P1) in the feeling space 70 which is the three-dimension space which is centered on "the degree of **", "reliability", and "vigilance", respectively, as shown in drawing 7 . It is the parameter with which "the degree of **" shows the degree of whether it has occurred or to sleep as which the degree which can recognize that to which the current robot 1 is observing the degree of for which instinct is fulfilled and "reliability" with firm belief, and "vigilance" are determined by biorhythm which exists in a living thing, respectively here.

[0048] This feeling space 70 responds to each value of "the degree of **", "reliability", and "vigilance". And some space field 70A beforehand, It is divided into 70B.... to each [these] space field 70A and 70B.., respectively "Joy (Joy)", "fear (Fear)" and "the resentment (Anger)" -- "-- feeling sad (Sadness) -- " -- "-- surprised (Surprise) -- " -- and mutually different emotions, such as "dislike (Hatred) etc.", are matched.

[0049] In this way, for feeling generation section 61B, it sets to this feeling space 70, and the feeling points P1 are which space fields 70A and 70B.... by whether it is inside While determining the feeling of the robot 1 at that time as the emotion matched with space field 70A to which the feeling point P1 belongs then, and 70B...., they are the space fields 70A and 70B from the feeling point concerned.. The distance to a core is determined as strength of the emotion.

[0050] Furthermore, although the value, the variation and time amount, and the robot 1 of parameter value of each desire held at instinct generation section 61A are looking at feeling generation section 61B, it changes the parameter value of "the degree of **", "reliability", and "vigilance" based on the degree of recognition etc., and thereby, it changes a robot's 1 feeling.

[0051] Feeling generation section 61B makes parameter value fluctuate about "the degree of **" in practice according to the variation, when the parameter value of either of each desire of the "food intake avarice" in instinct generation section 61A, "defecation avarice", "water intake avarice", "urination avarice", "motion avarice", "love avarice", "curiosity", and "sleep avarice" changes.

[0052] For example, when the parameter value of "defecation avarice" decreases, as it is shown in drawing 8 (A), when the parameter value of "the degree of **" is made to increase according to the variation and the parameter value of "food intake avarice" increases, feeling generation section 61B decreases the parameter value of "the degree of **" according to the variation, as shown in drawing 8 (B).

[0053] In addition, it is beforehand defined for every desire, respectively whether the parameter value of "the degree of **" is made to increase to the increment in the parameter value of desire, it is made to decrease, or how many parameter value of "the degree of **" are changed to the variation of the parameter value of desire.

[0054] Moreover, feeling generation section 61B makes parameter value fluctuate about "reliability" based on the degree (for example, whenever [matching]) of recognition to what the robot 1 is seeing then etc., and makes the parameter value fluctuate about "vigilance" based on magnitude, time amount which has occurred of parameter value of the "sleep avarice" held at instinct generation section 61A.
[0055] Space field 70A to which is attained to or the feeling point P1 concerned belongs from the feeling point P1 as a result by migration of the feeling point P1 in such "a degree of **", and "reliability" feeling space 70 accompanying the change in "vigilance", space fields 70A and 70B of 70B.... where the distance and the feeling point P1 to a core belong .. The very thing changes.
[0056] Thus, in feeling generation section 61B, a robot's 1 feeling is generated so that the condition may be changed according to the variation of the parameter value of each desire in instinct generation section 61A etc.
[0057] (1-2-3) The processing action decision section 62 of the action decision section 62 The counted value for every action currently held at the external information attaching part 60, Based on the condition (the class and its strength of an emotion) of the feeling at that time in feeling generation section 61B, the next action is determined as the magnitude list of the parameter value of each desire which instinct generation section 61A holds in instinct and the feeling generation section 61. It notifies to the action generation section 63 by making a decision result into the action decision information D2.
[0058] For example, when the action generation section 62 has the large counted value corresponding to the action which is near the robot 1 in the external information attaching part 60 of "kicking a ball", The parameter value of the "motion avarice" which instinct generation section 61A of instinct and the feeling generation section 61 holds is large, and the feeling condition of the robot 1 at that time in feeling generation section 61B opts for the action which starts with "it is glad" when the strength is large of "kicking a ball" as next action.
[0059] On the other hand, the action generation section 62 has the small parameter value of the "motion avarice" which instinct generation section 61A at that time holds, and is determined as other actions except the feeling condition of the robot 1 at that time in feeling generation section 61B "kicking a ball" as next action by "dislike", when the strength is large.
[0060] (1-2-4) In the processing action generation section 63 of the action generation section 63, if the action decision information D2 is given from the action decision section 62, control command COM for making a robot discover the action based on the action decision information D2 concerned will be generated, and this will be outputted to the corresponding sub control sections 43A-43D, respectively.
[0061] The action generation section 63 is made to correspond to each action of "he walks", "it sitting down", "dancing", etc. concretely, respectively. In order to make a robot 1 discover the action, the output shaft of which actuators A1-A14 (drawing 1 and drawing 2) was referred to as whether to carry out revolution actuation only of what include angle to which timing. It has the file (this is hereafter called an action file) which specified the serial content of control of each actuators A1-A14 for every action in external memory 58 (drawing 5).
[0062] And whenever the action decision information D2 is given from the action

decision section 62, the action generation section 63 generates control command COM based on the control parameter which carried out sequential playback of the corresponding action file, and was stored in the action file concerned, and sends it out to the sub control sections 43A-43D which correspond the control command COM concerned.
[0063] Sequential actuation of the actuators A1-A14 which correspond by the sub control sections 43A-43D which correspond based on this control command COM as a result will be carried out, and the action which applies a robot 1 in this way will be discovered.
[0064] Thus, in the Maine control section 40, it is made as [make / a robot 1 / to act autonomously according to the situation of the exterior and the interior, the existence of the command from a user, and influence, etc.].
[0065] (2) Explain action and the modulation of feeling, next the action which is this robot's 1 characteristic configuration and the modulation (modulation) of feeling.
[0066] (2-1) In the case of the robot 1 of modulation ** of the action based on feeling It is made to face the action for which the action decision section 62 opted as mentioned above that a robot 1 is discovered. A "rate" rate ["periodicity" of the action in the action file to which the action generation section 63 corresponds, and] by reaching or carrying out modulation processing of the control parameter about the "amplitude" according to the condition of the feeling of the robot 1 at that time It is made as [make / the condition of the feeling concerned / to reflect in action directly].
[0067] In practice, in the case of this robot 1, in each action file stored in external memory 58 as mentioned above, the modulation propriety information which shows whether it can modulate, respectively is stored about "periodicity", a "rate", and the "amplitude" of that action, respectively.
[0068] And if the next action is notified as action decision information D2 from the action decision section 62, the action generation section 63 The action file which corresponds from external memory 58 is read, and it is based on the modulation propriety information stored in the action file concerned. "Periodicity", a "rate" -- and -- "-- the propriety of modulation being judged to every amplitude", and, in being the action which cannot carry out modulation of the all Control command COM based on the control parameter stored in the action file concerned as mentioned above is generated, and the control command COM concerned is sent out to the corresponding sub control sections 43A-43D.
[0069] On the other hand, when the "periodicity" or of the action, "a rate" or, and the "amplitude" can be modulated, the action generation section 63 carries out modulation processing of the action concerned so that the condition of the feeling at that time in feeling generation section 61B of instinct and the feeling generation section 61 may be made to reflect.
[0070] The "degree of **" of the feeling space [in / as the action generation section 63 is concretely shown in drawing 9 / feeling generation section 61B] 70, The "periodicity" matched with each shaft of "reliability" and "vigilance", respectively, The action space 71 which is the three-dimension space specified with three shafts of a "rate" and the "amplitude" is defined, and the coordinate of the feeling point P1 in the feeling space 70 is mapped by the predetermined matching ratio in the action space 71 concerned.
[0071] In this case, can set up this matching ratio freely, for example, when the ratio between 1:3, "vigilance", and the "amplitude" is set [the ratio between the "degree of

", and "periodicity"] up for the ratio between 1:1, "reliability", and a "rate" with 2:3, it sets. feeling -- space -- 70 -- it can set -- feeling -- a point -- P -- one -- a coordinate ([the degree of **, reliability, vigilance]) -- [-- 50 -- 50,100 --] -- it was -- the time -- ** -- action space -- 71 -- mapping -- having had -- the back -- feeling -- a point -- P -- one -- ' -- a coordinate (= [periodicity, a rate, and the amplitude]) -- [50,150,150] -- becoming .

[0072] And the "periodicity" of feeling point P1' after mapping obtained by carrying out the action generation section 63 in this way, It is based on each coordinate of a "rate" and the "amplitude". "Periodicity" of the action, As opposed to "periodicity" of the action about the thing in which modulation of a "rate" and the "amplitude" is possible The coordinate of "periodicity" of feeling point P1' after mapping, As opposed to the "rate" of action The coordinate of the "rate" of feeling point P1' after mapping, So that the parameter value of "periodicity" and the "rate" as which the action was beforehand specified to the "amplitude" of action by the percentage of the value of the coordinate of the "amplitude" of feeling point P1' after mapping, or the "amplitude" may be made to increase Modulation processing of the control parameter to which it corresponds in the action file which specified the action is carried out.

[0073] It can follow, for example, all "periodicity" of the action, the "rates", and "amplitude" can be mapped. When the coordinate of "periodicity" of feeling point P1' after mapping in action space 71, a "rate", and the "amplitude" is [50,150,150] So that the increment in 50 [%] of is done to regular "periodicity", a "rate" may do the increment in 150 [%] of to regular "rate" and "periodicity" of the action may do the increment of the "amplitude" in 150 [%] to regular "amplitude" Modulation processing of the control parameter to which a corresponding action file corresponds is carried out.

[0074] The action generation section 63 makes a robot 1 discover the action based on the control command COM concerned in this way by generating control command COM based on the control parameter obtained by doing in this way after this, and sending out the control command COM concerned to the corresponding sub control sections 43A-43D.

[0075] Thus, in this robot 11, it is made as [make / the condition of the feeling at that time / to reflect in action].

[0076] (2-2) In modulation one side of the feeling based on action, and this robot 1, when discovering the action specified with the instruction from the outside, it is made as [make / this / to reflect in a robot's 1 feeling].

[0077] In practice, the action decision section 63 notifies this to instinct, the feeling generation section 61, and the action generation section 63, when it opts for the action specified with the instruction from the outside as next action.

[0078] At this time, the action generation section 63 reads the action file of this action for which it opted from external memory 58, generates control command COM based on the control parameter stored in the action file concerned, and sends out the control command COM concerned to the corresponding sub control sections 43A-43D. As a result based on this control command, that action is discovered by the robot.

[0079] Moreover, the action generation section 63 gives the control parameter about "periodicity", a "rate", and the "amplitude" of the action concerned stored in the action file of the action with this to instinct and the feeling generation section 61. For example, when this action is "laughing", the control parameter concerning ["periodicity" of the action and spacing of a sound] the "rate" of the action and the magnitude of a laughing

voice in the control parameter about the conformity of spacing of a sound is given to instinct and the feeling generation section 61 as a control parameter about the "amplitude" of the action among the control parameters about the laughing voice "********** ...." stored in the action file.

[0080] At this time, feeling generation section 61B of instinct and the feeling generation section 61 "Periodicity" of the action given from the action generation section 63 as shown in drawing 10 , While plotting the point (this is hereafter called the acting point P2) which makes parameter value of the control parameter of a "rate" and the "amplitude" the coordinate of "periodicity", a "rate", and the "amplitude", respectively on the above-mentioned action space 71 The acting point P2 is mapped by the predetermined matching ratio to the above-mentioned feeling space 70.

[0081] In this case, can set up this matching ratio freely, for example, when the ratio between 2:3, the "amplitude", and "vigilance" is set [the ratio between "periodicity" and the "degree of **"] up for the ratio between 1:1, a "rate", and "reliability" with 1:1, it sets. When the coordinates of the acting point P2 in action space 71 are [50, 10, 50], the coordinate after the acting point P2 concerned was mapped by the feeling space 70 is set to [50, 15, 50].

[0082] And the coordinate of acting point P2' after mapping obtained by carrying out feeling generation section 61B in this way, difference with the coordinate of the present feeling point (not shown in drawing 10) -- "the degree of **", and "reliability" -- and -- "-- for every vigilance", referring to the duration time The parameter value of the control parameter of the "degree of **" of the feeling point currently then held, "reliability", and "vigilance" is changed so that it may bring close to the coordinate of acting point P2' after mapping the coordinate of a current feeling point gradually.

[0083] Thus, in this robot 1, it is made as [make / self action / to reflect in the condition of the feeling at that time].

[0084] (2-3) In modulation another side of the feeling based on external information, and this robot 1, it is made as [make / the stimulus from the outside / reflect in self feeling].

[0085] It sets in practice to feeling generation section 61B of instinct and the feeling generation section 61. It is based on sound signal S1B (drawing 5) supplied from picture signal S1A (drawing 5) supplied from CCD camera 50 (drawing 5), or a microphone 51 (drawing 5). For example, recognition of an input with periodicity, such as light which blinks periodically, and music, detects "periodicity", a "rate", and the "amplitude" as characteristic quantity of the input concerned.

[0086] For example, when the applied periodic input is the flash of light, feeling generation section 61B detects the time amount of one burning as a "rate", and detects a brightness difference the brightest time at the time of a flash, and when dark as "amplitude" further while it detects the period of the flash as "periodicity." moreover -- the case where the periodic input which feeling generation section 61B requires is music -- the sound -- while detecting an easy rhythm as "periodicity" -- the sound -- easy Il Tempo -- as a "rate" -- detecting -- further -- the sound -- an easy loudness level is detected as "amplitude."

[0087] And feeling generation section 61B maps the point P3 detecting [external input] by the predetermined matching ratio to the feeling space 70 while plotting the point (this is hereafter called the point P3 detecting [external input]) which makes the value of "periodicity" of the input which carried out in this way and was detected, a "rate", and the

"amplitude" the coordinate of "periodicity", a "rate", and the "amplitude", respectively on the above-mentioned action space 71, as shown in drawing 11 .
[0088] Also in this case, this matching ratio can be set up freely. For example, when the ratio between 1:3, the "amplitude", and "vigilance" is set [the ratio between "periodicity" and the "degree of **"] up for the ratio between 1:1, a "rate", and "reliability" with 2:3, it sets. When the coordinates of the point P3 in action space 71 detecting [external input] are [50, 10, 50], the coordinate after the point P3 concerned detecting [external input] was mapped by the feeling space 70 is set to [50, 30, 75].
[0089] And the coordinate of detecting [external input] point P3' after mapping obtained by carrying out feeling generation section 61B in this way, difference with the coordinate of the present feeling point (not shown in drawing 11) -- "the degree of **", and "reliability" -- and -- "-- for every vigilance", referring to the duration time The parameter value of the "degree of **" of the feeling point currently then held, "reliability", and "vigilance" is updated so that it may bring close to the coordinate of detecting [external input] point P3' after mapping the coordinate of a current feeling point gradually.
[0090] Thus, in this robot 1, it is made as [make / self feeling / change according to an external input with periodicity].
[0091] In actuation of the gestalt of this operation, and the configuration beyond effectiveness (3) This robot 1 The coordinate of the feeling point P1 of expressing the current robot's 1 feeling in the feeling space 70 is changed into the coordinate on action space 71. While changing the control parameter about "periodicity", a "rate", and the "amplitude" of the next action based on the coordinate after the conversion concerned and expressing the discovered action as a coordinate on action space 71 The coordinate concerned is changed into the coordinate on the feeling space 70, and the control parameter about the "degree of **" of current feeling in the feeling space 70, "reliability", and "vigilance" is changed based on the coordinate after the conversion concerned.
[0092] Therefore, the same action can also attach change according to the condition of the feeling at that time, and this robot 1 can perform a various and direct feeling expression with that much small number of actions. Moreover, this robot 1 can make action reflect in the condition of feeling directly.
[0093] According to the above configuration, the coordinate of the feeling point P1 of expressing the current robot's 1 feeling in the feeling space 70 is changed into the coordinate on action space 71. By having made it change the control parameter about "periodicity", a "rate", and the "amplitude" of the next action based on the coordinate after the conversion concerned The same action can also attach change according to the condition of the feeling at that time, a various and direct feeling expression can be performed with that much small number of actions, and the high robot equipment of entertainment nature can be realized in this way.
[0094] Moreover, while expressing the discovered action as a coordinate on action space 71 By changing the coordinate concerned into the coordinate on the feeling space 70, and having made it change the control parameter about the "degree of **" of current feeling in the feeling space 70, "reliability", and "vigilance" based on the coordinate after the conversion concerned Action can be made to be able to reflect in the condition of feeling directly, and entertainment nature can be raised also by this.
[0095] (4) it is the gestalt of other operations -- although the case where this invention was applied to the robot 1 of the 2-pair-of-shoes walk mold constituted like drawing 1

and drawing 2 in the gestalt of above-mentioned operation was described -- this invention -- not only this -- in addition, it is widely applicable to the robot equipment of various gestalten.
[0096] Moreover, although the case where the feeling space 70 and action space 71 were defined as coordinate space of a three dimension was described, you may make it define this invention in the gestalt of above-mentioned operation as coordinate space-dimensional [two or more] not only this but other than this.
[0097] Furthermore, in the gestalt of above-mentioned operation, although only the case which carries out modulation processing of "periodicity", a "rate", and the "amplitude" of action was described based on the condition of current feeling You may make it operate this invention so that configuration parts, such as the head unit 3 which is not used not only this but in case it performs the action, for example in addition to this, and each arm units 4A and 4B, each leg units 5A and 5B, may be moved according to the condition of the feeling at that time.
[0098] The control data which specified various actuation ("its head is hung in the head" etc. when sad), respectively is stored in external memory 58. in this case -- about the configuration section made to specialize in various emotions, like "it is glad" beforehand, respectively -- ** -- The control parameter of "periodicity" of this action by which modulation processing was carried out, a "rate", and the "amplitude", By generating control command COM based on the control data of operation suitable for the current robot's 1 feeling, and sending out the control command COM concerned to the corresponding sub control sections 43A-43D What is necessary is making it just make a robot 1 discover the action based on the control command COM concerned, and this actuation.
[0099] You may make it change the control parameter about "periodicity", a "rate", and the "amplitude" of the actuation which starts further the same with furthermore having mentioned above about drawing 9 in this case.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view showing the appearance configuration of the robot by the gestalt of this operation.
[Drawing 2] It is the perspective view showing the appearance configuration of the robot

by the gestalt of this operation.
[Drawing 3] It is the conceptual diagram with which explanation of the appearance configuration of the robot by the gestalt of this operation is presented.
[Drawing 4] It is the perspective view showing the internal configuration of the robot by the gestalt of this operation.
[Drawing 5] It is the perspective view showing the internal configuration of the robot by the gestalt of this operation.
[Drawing 6] It is the block diagram with which explanation of processing of the Maine control section is presented.
[Drawing 7] It is the conceptual diagram with which explanation of feeling space is presented.
[Drawing 8] It is the conceptual diagram with which explanation of change of feeling is presented.
[Drawing 9] It is the conceptual diagram with which explanation of the modulation of the action based on feeling is presented.
[Drawing 10] It is the conceptual diagram with which explanation of the modulation of the feeling based on action is presented.
[Drawing 11] It is the conceptual diagram with which explanation of the modulation of the feeling based on external information is presented.
[Drawing 12] It is the conceptual diagram with which explanation of the gestalt of other operations is presented.
[Description of Notations]
1 [.. External information attaching part,] .... A robot, 40 .. The Maine control section, 58 .. External memory, 60 61 .... Instinct and the feeling generation section, 61A .. The instinct generation section, 61B .. Feeling generation section, 62 [.. A space field, 71 / .. Action space, P1 / .. A feeling point, P2 / .. An acting point, P3 / .. The point detecting / external input /, S1 / .. An external sensor signal, S2 / .. Internal sensor signal.] .... The action decision section, 63 .. The action generation section, 70 .. Feeling space, 70A, 70B, 70C

[Translation done.]

DRAWINGS

[Drawing 1]

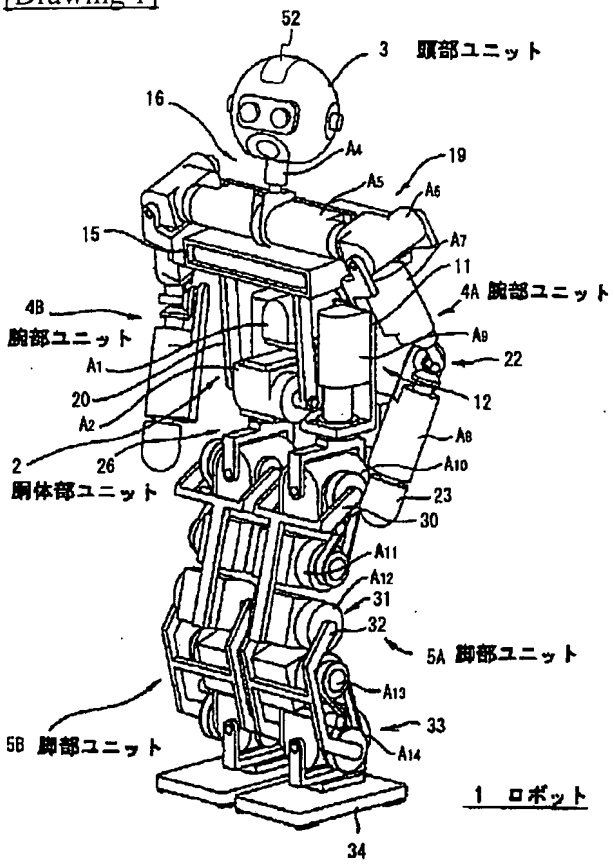

図１　本実施の形態におけるロボットの外観構成（１）

[Drawing 2]

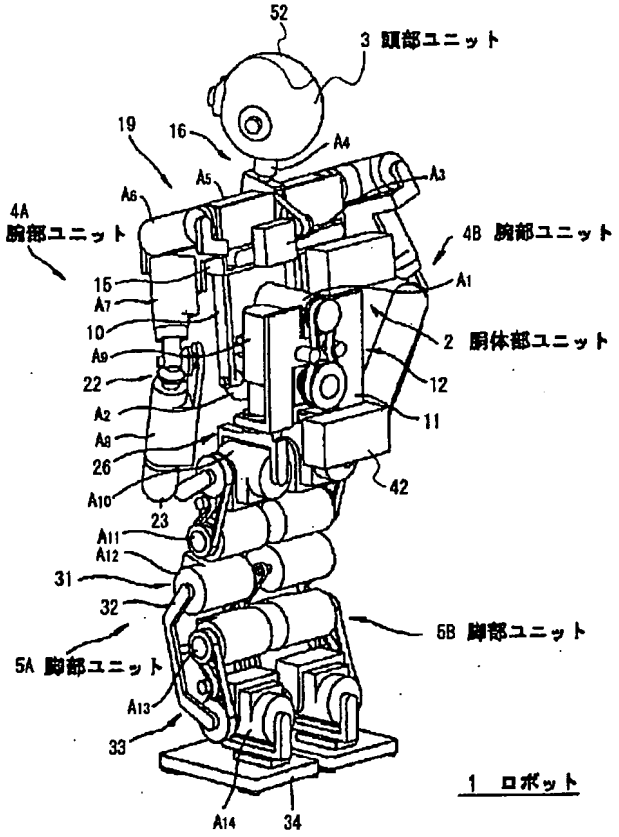

図２　本実施の形態によるロボットの外観構成（２）

[Drawing 5]

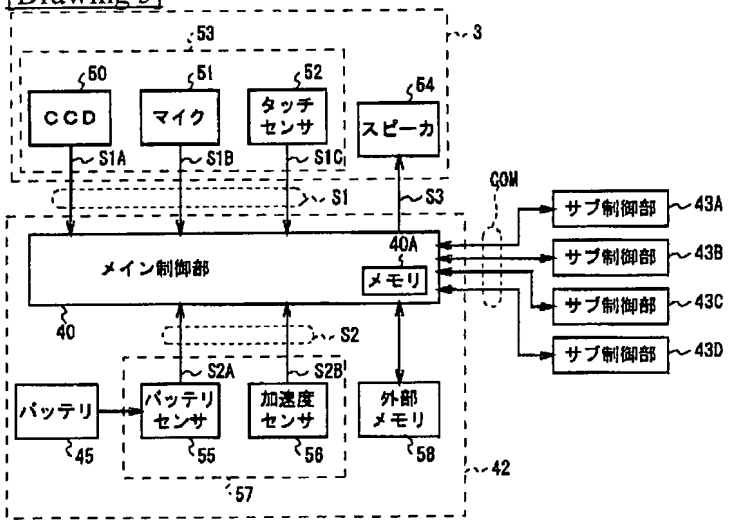

図５　ロボットの内部構成（２）

[Drawing 6]

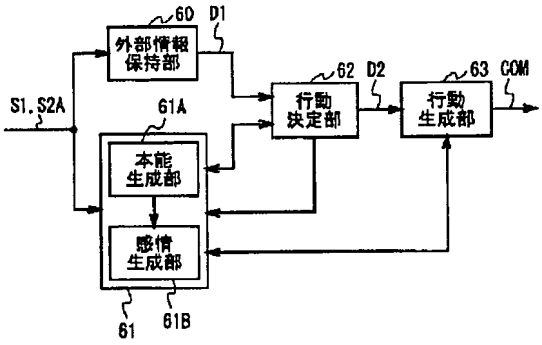

図６　メイン制御部の処理

[Drawing 3]

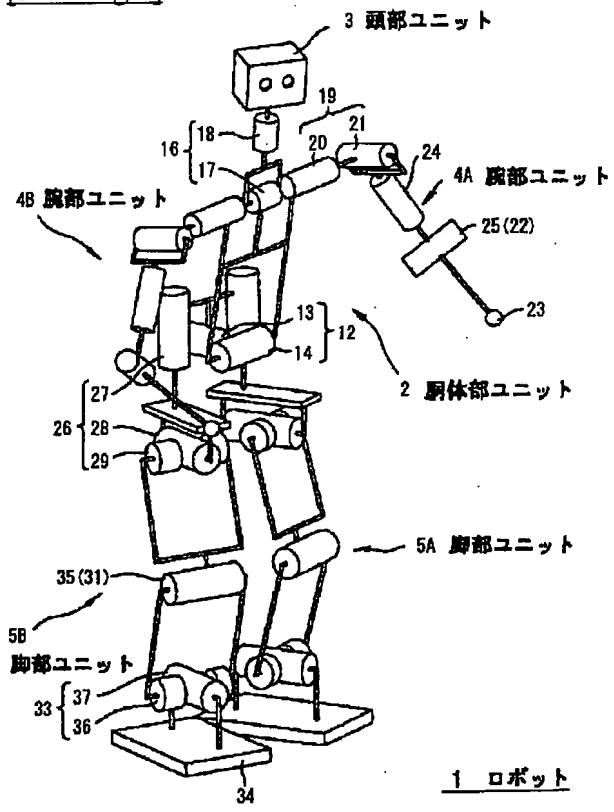

図３　本実施の形態によるロボットの外観構成（３）

[Drawing 4]

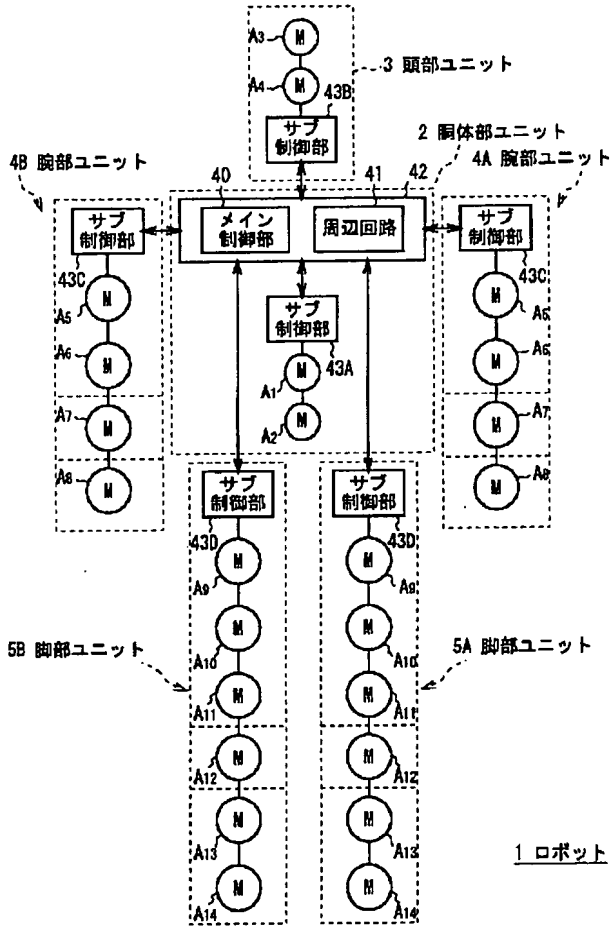

図４　ロボットの内部構成（１）

[Drawing 7]

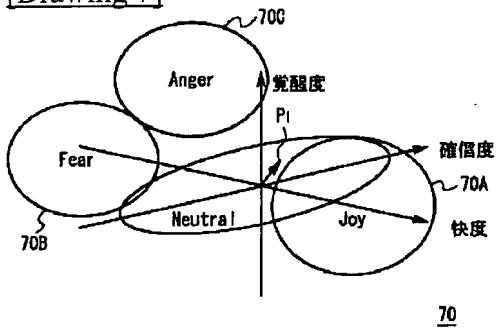

図７　感情空間

[Drawing 9]

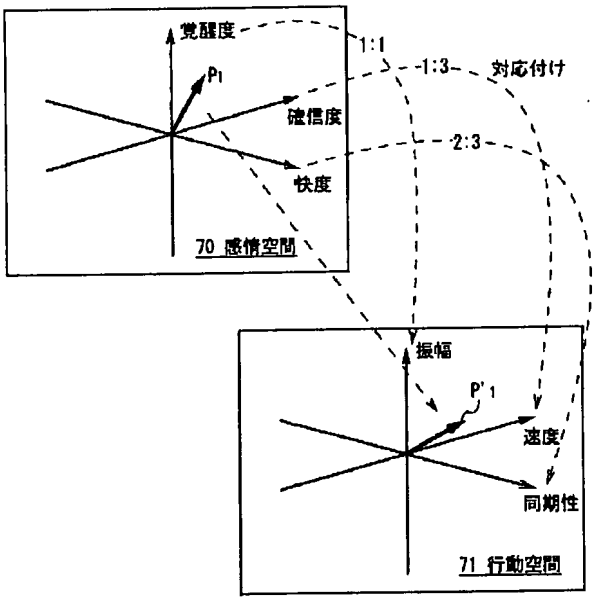

図９　感情に基づく行動のモジュレーション

[Drawing 8]

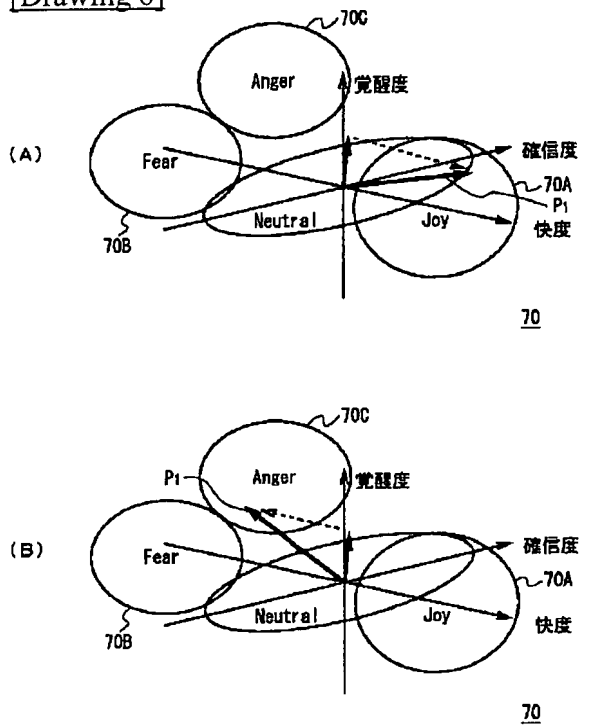

図８　感情の変化

[Drawing 10]

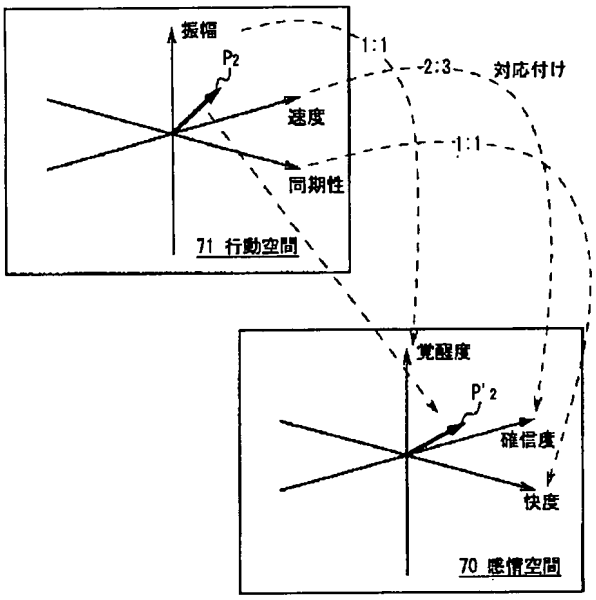

図１０　行動に基づく感情モジュレーション

[Drawing 11]

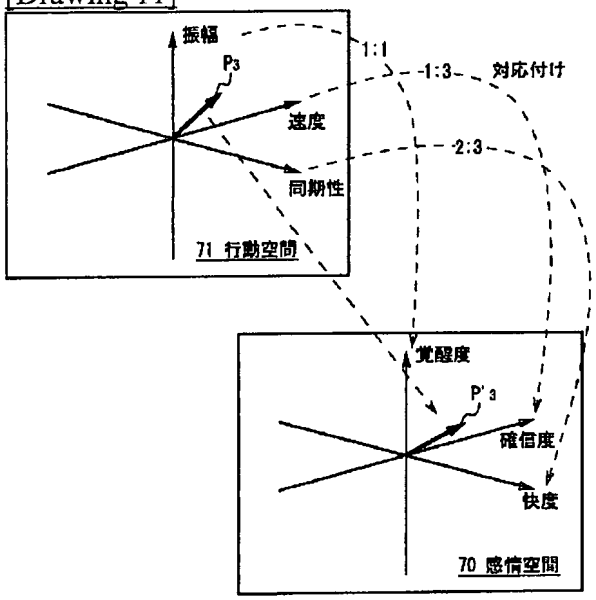

図１１　外部情報に基づく感情のモジュレーション

[Drawing 12]

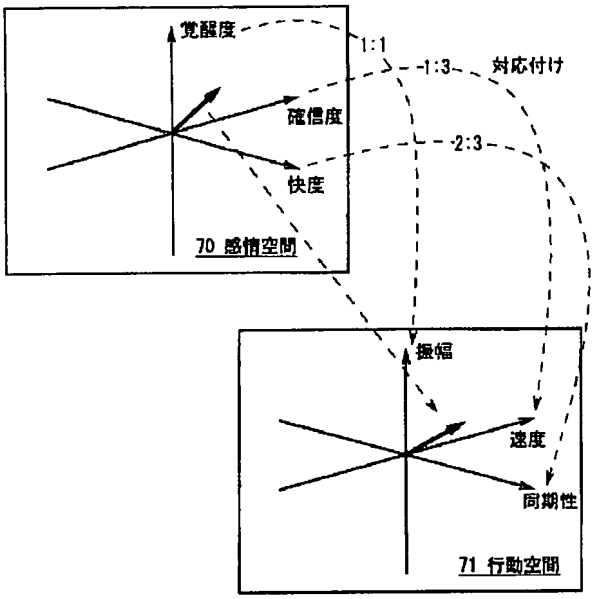

図１２　他の実施の形態

[Translation done.]